

Acknowledgments

We thank Rex Lohoff and Tim Troyer for assistance in field studies and Joyce Zaiger in statistical computations.

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Accepted for publication August 7, 1979.

Bull. Southern California Acad. Sci.
79(1), 1980, pp. 13–19

A New Frog of the Genus *Eleutherodactylus* (Leptodactylidae) from the Monteverde Forest Preserve, Costa Rica

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Abstract.—A new frog of the genus *Eleutherodactylus* (Leptodactylidae) from the Monteverde Forest Preserve, Costa Rica by Jay M. Savage, *Bull. Southern California Acad. Sci.*, 79(1):13–19, 1980. *Eleutherodactylus cuaquero* from the Monteverde Forest Reserve in the Cordillera de Tilaran, Costa Rica, is described as new. The species appears to be closely allied to *El. andi* of central montane slopes of Costa Rica. Both forms appear to be members of the *fitzingeri* species group. *El. cuaquero* is unique in the family Leptodactylidae in the condition of the jaw muscles with three major slips to the depressor and only an externus adductor (formula: DFSQAT + e).

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In 1964 as part of the fieldwork associated with the discovery of the unusual toad, *Bufo periglenes* (Savage 1967), collections were made of other amphibians in the area around the famous Quaker colony at Monteverde, Provincia de Puntarenas, Costa Rica. Included in these samples were two female *Eleutherodactylus* resembling *El. andi* of the *fitzingeri* group (Savage 1974, 1976) that seemed to represent an undescribed species. Description of this form has been delayed in the hope that a male example might be obtained. After 15 years the hope has not materialized. The forest area around Monteverde has now been established as a preserve to protect *B. periglenes*, where all collecting is strictly prohibited and there appears to be little likelihood that another 15 year wait will produce a male example. For this reason it seems wise to describe the new form at this time as:

Eleutherodactylus cuaquero, new species

Figure 1

Holotype.—LACM 128460, an adult female from 1.75 km east southeast of Monteverde; Provincia Puntarenas, Canton de Puntarenas, Costa Rica; 1520 m; collected by Jay M. Savage and Fred S. Truxal, May 17, 1964. *Paratype*: CRE 7213B, an adult female, with same data as holotype.

Diagnosis.—*El. cuaquero* is a member of the *fitzingeri* group (Savage, 1976) and allied to Central American members (*andi*, *fitzingeri*, *rayo*, and *talamancae*) of this stock having a minimal amount of toe webbing. The other Central American members of the group (*crassidigitus* and *longirostris*) have the web between toes III–IV extending nearly to the distal subarticular tubercle on finger III and to halfway between proximal and penultimate subarticular tubercles on finger IV. From its congeners of this group with minimal webbing (features for *cuaquero* in parentheses) it is immediately distinguished from *El. rayo* of Costa Rica and *El. talamancae* of Atlantic lowland Nicaragua, Costa Rica and Panama which have the posterior thigh surface uniform (posterior thigh surface spotted). In addition *rayo* has a heel calcar (absent) and *talamancae* has a distinct enamel white stripe or series of spots along the upper lip (absent).

The two remaining allied forms with spotted thighs (*El. fitzingeri* and *El. andi*), that might be confused with the new form have toe webbing that usually extends to the proximal subarticular tubercles between toes I–II–III and slightly beyond the proximal subarticular tubercles between toes III–IV (webbing barely extending to level of proximal margin of proximal subarticular tubercle on any toe). The three forms may be further separated by the following features:

andi—finger disks greatly enlarged, III–IV emarginate, equal to or broader than length of inner metatarsal tubercle; posterior thigh surface dark chocolate brown with discrete large bright-yellow (in life) stripes or spots; groin with bright-yellow (in life) large spots or stripes; throat almost solid black to dark brown, undersurfaces of body and limbs heavily marked with dark brown spots or mottling; light areas on posterior undersurfaces bright yellow, almost always suffused with



Fig. 1. Dorsal view of adult female holotype, LACM 128460 of *Eleutherodactylus cuaquero*.

bright salmon red in life; adult males 40–55 mm in standard length, adult females 65–80 mm.

cuaquero—finger disks greatly enlarged, III–IV emarginate, broader than length of inner metatarsal tubercle; posterior thigh surface dark brown, with small bright yellow spots or vertical stripes; groin mottled; throat and hindlimbs heavily marked with dark brown pigment; posterior undersurfaces bright yellow, suffused with bright pink in life; adult females 33–47.5 mm in standard length.

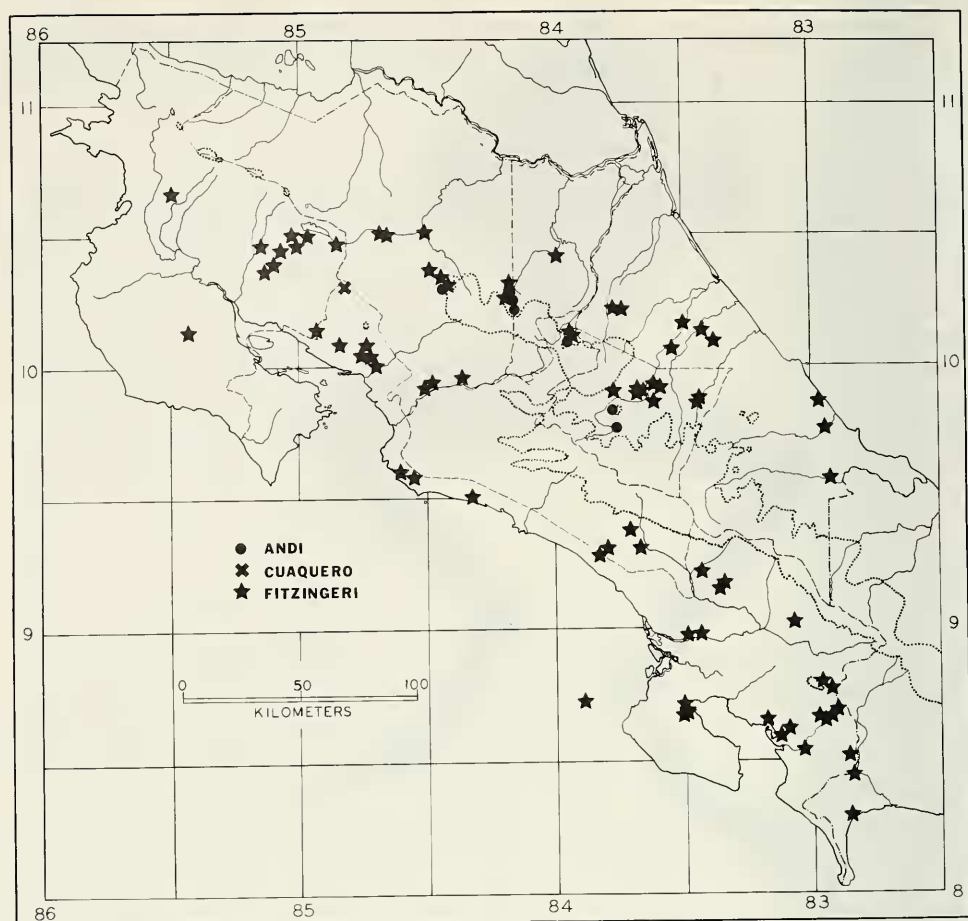


Fig. 2. Distribution of *Eleutherodactylus cuaquero* and allied species of the *fitzingeri* group in Costa Rica. The dotted line indicates the 1500 m contour.

fitzingeri—finger disks moderately enlarged, III–IV barely indented, narrower than length of inner metatarsal tubercle; posterior thigh surface dark black to brown, with numerous small pale yellow spots in life; groin mottled or uniform; throat almost immaculate to heavily mottled with dark brown; undersurfaces white with a yellow cast posteriorly and under thighs, usually immaculate but sometimes weakly mottled with dull gray and rarely strongly mottled with dark brown; adult males to 35 mm in standard length, adult females to 52 mm.

Summary of characteristics.—GENERAL: Head about as wide as long. Nostril closer to tip of snout than to eye. Dorsal outline of snout subovoid to subelliptical; rounded in profile. Canthus sharp; loreal outline obtuse. Choanae ovoid, vomerine teeth located between and behind choanae in two transverse series separated at mid-line. Tympanum internal, indistinct, oval, a little less than $\frac{1}{2}$ height of orbit. Skin of head and upper surfaces essentially smooth with a few scattered pustules. Each upper eyelid with a distinct tubercle. Finger II longer than I.

Finger disks about 2 times as wide as digits on fingers III–IV: rounded and expanded on finger I, palmate on finger II, emarginate on fingers III–IV. No distinct fringes on fingers. Subarticular tubercles flattened, rounded in outline, globular; no supernumerary tubercles; thenar tubercle elongate, palmar large cordate; no accessory palmar tubercles. No calcar, although heel with several tubercles. Toe disks emarginate or notched, about 1.5 times width of digit on toes I–IV. Toe fringes weak. Modal toe webbing formula: $12^{+}-\frac{1}{2}112^{+}-3\frac{1}{2}113^{+}-4^{+}114^{+}-3-V$. Subarticular tubercles projecting, ovoid, in outline, obtuse in profile; no supernumerary tubercles; outer plantar tubercle round, $\frac{1}{4}$ size of inner oval plantar tubercle. An inner tarsal fold. Venter smooth.

COLORATION: Upper surfaces of head and body dark brown, limbs lighter brown. An obscure interocular dark bar bordered anteriorly by an obscure light area; upper lips with three dark bars; a definite supratympanic dark mark running from middle of eye above tympanum and downward toward shoulder. Iris of eye dark brown below, upper half silver, in life. Dorsum nearly uniform with weak dark spots associated with dorsal tubercles. Dorsal surfaces of limbs with dark crossbars. Posterior surface of thigh dark brown with distinct light spots or spots lined up to form vertical stripes. Throat and underside of hindlimbs heavily marked with dark brown pigment; distinct light longitudinal stripe running length of throat. Plantar surface uniform. Groin and flanks without distinctive markings. In life, hindlimbs and groin suffused with pale rose.

MEASUREMENTS: In the following section the measurement for the holotype is given first followed by that for the paratype (CRE 7213B) in parentheses. Standard lengths are in millimeters; other measurements are given as percentages of standard lengths.

Standard length 47.5 (33.0); head length 39.6 (40.9); head width 39.4 (38.2); length of orbit 15.2 (16.7); snout length 18.7 (19.7); loreal length 12.0 (13.0); height of tympanum 6.9 (7.0); hindlimb length 230.7 (227.9); tibia length 75.4 (71.8).

Jaw musculature.—The types have the depressor mandibulae originating as three distinct slips, one each from the dorsal fascia, squamosal and annulus tympanicus. This is the DFSQAT condition according to the system of Starrett (1968). An adductor mandibulae externus superficialis is present (e).

Distribution.—Known only from the lowermost portion of the lower montane rainforest 1.75 km ESE Monteverde in the Cordillera de Tilaran, Costa Rica, 1520 m (Figure 2).

Ecological associates.—Both known examples of *El. cuaquero* were taken early in the evening (7–9 p.m.) on herbaceous vegetation 1–1.5 m high. Ecological associates included the frogs: *Eleutherodactylus angelicus*, *El. cruentus*, *El. diastema*, *El. melanostictus*, *El. ridens*, *Hyla rivularis*, *H. pseudopuma*, *H. uranochroa*, *Centrolenella colymbiophyllum* and *C. prosoblepon* and the lizard *Norops tropidolepis*.

Remarks.—The name *cuaquero* is an arbitrary combination of letters that happens to mean Quaker in Spanish. The name is used in allusion to the habitat of this frog, whose type locality is located on part of the property that formed the original land holdings of the Quaker colony at Monteverde. The settlement was established in 1951 on the Pacific slope by 15 families of North American Quakers whose moral and economic beliefs led them to emigrate so that their taxes would

not be used for the construction of nuclear armaments. By 1954 the Quakers had established a cooperative cheese factory where the famous Monteverde brand cheeses continue to be made.

The Quakers from the beginning at Monteverde strongly believed in preservation of forest tracts and a watershed preserve. The flora and fauna of the area is especially rich and the discovery of the unique toad, *Bufo periglenes* Savage, 1967, on the continental divide above Monteverde, heightened the Quakers' interest in conservation of the local biota. George Powell, originally an American Peace Corps worker, conceived the idea of establishing a permanent nature preserve in the area in 1971 and led a campaign to raise funds from a variety of sources to make the Monteverde Forest Preserve a reality. The Quaker colony donated 900 hectares of the some 2800 hectares that now comprise a preserve that involves both Atlantic and Pacific slope areas to the north and east of Monteverde proper. The preserve includes 7 major tropical plant formations and ranges in elevation from 1500–1842 m. The preserve is now owned and operated by the nonprofit Tropical Science Center of San Jose and is enjoyed by many visiting nature lovers each year. A visitor's center and a recently completed field station supplement the accommodations at Monteverde, for those interested in observing and/or photographing the rich biota of upland Costa Rica in this essentially undisturbed preserve.

Relationships.—*Eleutherodactylus cuaquero* clearly belongs, on the basis of external morphology, to the *fitzingeri* group (Savage 1976). Members of this stock have smooth venters, an inner tarsal fold, at least basal toe webbing and enlarged disks on all fingers and toes. Lynch (1976) has advocated inclusion of a number of species usually associated with the *rugulosus* (Savage 1975) and *gollmeri* (Savage 1976) groups into a larger unit including the *fitzingeri* group (*sensu* Savage), on the basis of trivial external features. Savage and DeWeese (1979) pointed out similarities between the *fitzingeri* and *rugulosus* groups in karyology and jaw musculature, but refrained from attempting to undertake a full critique and evaluation of Lynch's schemata.

Up until the present time all members of the *fitzingeri* group whose jaw muscles had been examined had the depressor mandibulae forming a single slip with an origin primarily from the dorsal fascia and a few fibers coming from the squamosal and the adductor mandibulae externus superficialis present (dfsq + e, using the formula of Starrett 1968). *El. cuaquero*, which on the basis of all other features seems very close to *El. andi*, differs not only from other members of the *fitzingeri* group in which the jaw musculature is known, but is unique in the family Leptodactylidae in having a formula of DFSQAT + e. The interpretation of the significance of this feature must await detailed studies of interspecific and intergroup variation in jaw muscle features. Suffice it to say that the muscle character strongly confirms the validity of *El. cuaquero* as a distinctive species.

Acknowledgments

The curators at the Museum of Natural History of Los Angeles County (LACM) and the Museo Zoologia, Universidad de Costa Rica, aided the research in several ways. James E. DeWeese and James M. Polisini of the University of Southern California (CRE) prepared the photograph and map, respectively. Aid in the fieldwork associated with my John Simon Guggenheim Foundation Fellow-

ship (1963–1964) in Costa Rica was provided by Norman J. Scott and the Organization for Tropical Studies. It is a pleasure to express my thanks for the support of these institutions and individuals.

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Accepted for publication April 10, 1980.

Bull. Southern California Acad. Sci.
79(1), 1980, pp. 19–37

Navajo Social Interactions in an Urban Environment: An Investigation of Cognition and Behavior

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Abstract.—Navajo social interactions in an urban environment: an investigation of cognition and behavior by Shirley J. Fiske and J. C. Weibel, *Bull. Southern California Acad. Sci.*, 79(1):19–37, 1980. This paper explores the relationship between the way people think and what they do, among a recently migrated urban ethnic group. The hypothesis is that people will seek assistance (housing, employment, friends) from other people whom they perceive as most similar to themselves. The paper compares two sets of data in an attempt to examine this relationship. Both cognitive and behavioral data on social interactions were collected from Navajo women in Los Angeles, California. The data indicate that urban Navajo women tend to establish their social assistance networks based on some of the underlying dimensions of their cognitive classifications of the urban social world, but that in other respects their behavior diverges from the expected

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